"COMPARATIVE STUDY OF SQUARE/TRIANGULAR SCLERAL FLAP IN TRABECULECTOMY ALONG WITH 5-FU"

A THESIS

FOR

Master of Surgery

(OPHTHALMOLOGY)

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2004

HIMANSHU KUMAR

DEDICATED

TO

MY PARENTS

DEPARTMENT OF OPHTHALMOLOGY
M.L.B.MEDICAL COLLEGE, JHANSI

CERTIFICATE

This to certify that the work entitled " **COMPARATIVE STUDY OF SQUARE/TRIANGULAR SCLERAL FLAP IN TRABECULECTOMY ALONG WITH 5-FU"** which is being submitted as a thesis for M.S/ (Ophthalmology) examination 2004 of Bundelkhand University By Dr. Himanshu Kumar , has been carried out in the Department of Ophthalmology , M.L.B. Medical College, Jhansi.

He has put in the necessary stay in the department as per University regulations.

Dated: 27/1/04

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The work has been carried out under my direct supervision and guidance. The techniques and statistical methods used in this thesis have been undertaken by the candidate himself and checked by me from time to time.

He has put in the necessary stay in the department as per University regulations.

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Dated: 27/1/04

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(Dr. Himanshu Kumar)

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INTRODUCTION

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The advances in the field of ophthalmology during the past two decades have been revolutionary. Although an association between Glaucoma and elevated intra ocular pressure was first suggested 379 years back (1622) by Richard Bankister, it was not recognized until 19th century that glaucoma was distinct group of ocular disorder. Surgical attempts to treat glaucoma by lowering pressure developed only in the 19th century when this link became generally accepted.

Glaucoma is a leading cause of irreversible blindness through the world. The World Health Organization spastics published in 1995 indicate that Glaucoma account for blindness in 5.1 million person or 13.5% of global blindness (behind cataract & trachoma at 15.8 million & 5.9 million person or 41.8% and 15.5% of global blindness respectively.

Glaucoma is the third leading cause of blindness with an estimated 5.1 million people world wide who is blind as a result of this disease. It is the second leading cause of blindness in United States and Fourth in India. Due to aging of the population, the

number of patients with Glaucoma is rising, and by the year 2000, approx, 67 million people are expected to be blind as a result of this disease.

Glaucoma is still one of the most puzzling diseases in the ophthalmology. Its prevalence is increased due to increasing. Life expectancy and better diagnostic techniques and is considered next to cataract in causing visual morbidity.

Glaucoma is symptomatic condition not a disease characterized by increase intraocular pressure which is not compatible with normal physiological function of eye (Diurnal variation >5mm) resulting , damage the optic nerve head & irreversible visual field defect.

Glaucoma is a triad of complex consisting of raised intraocular pressure, disc changes and field changes. Presence of all or any two of the findings are essential to make diagnosis. Glaucoma is now considered as an optic neuropathy of unknown etiology. Various risk factors have been found to be associated to the causation of disease like, age, Heredity, Myopia and diabetes. The disease is characterized by structural changes visible in optic disc and never fibre layer and functional changes detected by

static and kinetic perimetery. The intraocular pressure is only factor which can be modified to date.

The conventional method for reducing intraocular pressure is Filtration surgery.

Various types of Filtration surgery have been done by different ophthalmic surgeons, like sclerotomy, Iridencleisis, Filtering bleb Sclerecto- Iridectomy, posterior lip sclerotomy. In 1968 CAIRNS developed a new technique for Glaucoma surgery called Trabeculectomy. Now Trabeculectomy is the procedure of choice for Glaucoma surgery, although the success rate in lowering intraocular pressure is not higher but it reduces the incidence of complication and today it is the only surgical procedure for maintaining normal intraocular pressure in the long term. The mechanism postulated to account for intraocular pressure reduction after trabeculectomy include transconjunctival filtration of aqueous, resorption through walls of degenerated veins, movement of aqueous into superficial conjunctival lymphatic or into aqueous vein. Out flow may be via schlemms canal in few cases or perhaps even through uveo-scleral drainage. The

character and morphology of the bleb is determined by the predominance and combination of these routes.

Trabeculectomy may fail from occlusion of internal sclerostomy (by iris , descemet membrane , vitreous blood or cilliary body) or from external scarring of the surface tissues . Internal occlusion is largely preventable by proper surgical technique. Fibrosis over the external sclerotomy site, however is a far more important cause of failure of bleb formation and is harder or impossible to prevent.

Maintenance of normal intraocular pressure after Trabeculectomy alone appears sound at onset but its long term efficacy in maintaining a normal functioning bleb and hence normal intraocular pressure is disappointing in due course of time i.e. over months and years. Thus can be attributed to postoperative progressive scarring of conjunctiva and tenons capsule at the filtrate site, a process in which fibroblasts play a prominent role.

The use of antifibrotic agent, like 5-FU, has its advantages and disadvantages, intraoperative use of 5-FU has been shown to be beneficial at the time of initial surgery in phakic eyes with open

angle glaucoma. Adjunctive 5-FU increases success rate, decrease the level of postoperative intraocular pressure and reduces the postoperative anti-glaucoma medication. Intraoperative and long term side effects of 5-FU are minimal if the drugs is properly used during surgery.

Hence this study was carried out to further our understanding of the effect of triangular and square scleral flap on successful outcome of glaucoma pressure and minimal intraoperative , immediate postoperative and long term complications with the use of adjunctive 5-FU.

AIMS

&

OBJECTIVES

AIMS AND OBJECTIVES

To study the effect of triangular and square scleral flap (trabeculectomy) along with 5-FU on successful outcome of glaucoma surgery.

In terms of lowering postoperative intraocular pressure and minimal intraoperative, immediate, postoperative and long term complications.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Glaucoma has affected the mankind ever since the emergence of mankind on the earth. But it was not recognised by the Classical and the Alexandrian Greeks as a specific disease and was considered as a part of cataract. The term GLAUCOMA was first used by Hippocrates in 420 B.C. to describe blindness coming on in advancing years associated with the glazed appearance of the pupil – "If the pupil becomes sea coloured the sight is destroyed and blindness of other eye often follows."

The word glaucoma has usually been interpreted as implying a greenish or bluish hue, but it is more probable that to the Greeks it indicated no specific colour but the dull sheen or "glaze" of blindness. The term was used without any specific pathological connotations and represented no morbid entity, but probably included absolute glaucoma among other conditions. Glaucoma as we know today was vaguely classified as amblyopia, amaurosis, or gutta serena. Originally it was undifferentiated from cataract; both diseases were located in the lens, then considered the essential organ of vision, and both depended on a disturbance of visual

sprits. Only at later date it was recognised by Celsus (25 B.C.-A.D. 50) and Rufos of Ephesus (95-117) and later by Glen (131-210) and other writers of early centuries that the morbid condition situated behind the pupil which gave rise to blindness could be differentiated in to two groups, "suffusions" or cataracts which were amenable to cataract treatment, and the glaucoma which were not. Michael Brisseau (1709) of Paris for the first time showed that cataract was an opacification of the lens and disproving any lenticular abnormality in glaucoma by anatomical examination of the eyes of Bourdelot, the blind physician of Louis XIV.

The first suggestion of a disease associated with a rise in intraocular pressure and thus corresponding to what is known as glaucoma seems to occur in Arabian writings of At-Tabari (10^{th} century) who wrote in the "Book of Hippocratic treatment" of chronic inflammatory conditions of eye with raised tension. The first original and clear recognition of such a condition in European writing is by Richards Bainster (1622), who in his book on Ophthalmology clearly differentiated between a curable cataract (gutta obscura) and glaucoma (gutta serena) wherein "the humour

settled in the hollow nerves, be grown to any solid or hard substance, it is not possible to be cured", and gave a tetrad of features: tension with long duration of disease, the absence of perception of light and the presence of fixed pupil. Antoine-Pierre Demours (1818) gave the first excellent description of Glaucoma with raised ocular tension; he noted and described for the first time the appearance of colours of rainbow around lights.

In Germany Karl Heinrich Weller (1826) wrote of the hardness of eye not only in established but also in the developing condition, and described two entities Arthritic ophthalmia without a greenish pupil and glaucoma wherein this was present. In London, G.J. Guthrie (1823) recognised hardness of the eye as characteristic of a disease which he called glaucoma.

With the introduction of the Ophthalmoscope, clinical observations on the glaucomatous cup begin to accumulate (Jacobson, 1853; Von Graefe, 1854-57; Weber, 1855; and others). These observations about cupping of optic disc were confirmed by the pathological researches of Heinrich Muller (1856). Von Graefe (1857) divided glaucoma on the basis of clinical picture in to three categories- acute, chronic and secondary, and the anomaly that

Ophthalmoscope had lately revealed in the eyes with on signs of congestion as "amaurosis with excavation of the optic nerve". The final important clinical observation was the unifying concept of Donders (1862), who recognised the last condition wherein an incapacitating increased tension occurred without any inflammatory symptoms as simple glaucoma.

Max Knies (1876) and Adolf Weber (1877) discovered that there is increase in frequency of obstruction of the angle of anterior chamber in glaucoma. Priestley Smith (1879-91) stressed faulty drainage rather than the theory of overproduction of fluid as the cause of glaucoma.

With the aid of early types of Gonioscope, Salzmann (1914-15), Troncoso (1925-35), Thorburn (1927) and Sigurd Werner (1932) pointed out that in some glaucomatous eyes the angle of anterior chamber was closed while in others it was open. Otto Barkan (1938) with an improved type of Gonioscope used with a contact lens divided glaucoma on one hand, with deep anterior chamber and an open angle, on the other hand, with a shallow anterior chamber the drainage angle of which closed to produce a rise in tension.

The glaucoma is classically defined as a symptom complex in which the intraocular pressure of the eye is not compatible with the normal physiological functioning of the eye, with diurnal variation of more than 5mm Hg of intra ocular pressure and is associated with visual field changes.

Von Graefe (1857) was first divided glaucoma on the basis of clinical picture in to three categories- acute, chronic and secondary, and the anomaly that Ophthalmoscope had lately revealed in the eyes with on signs of congestion as "amaurosis with excavation of the optic nerve". Donders (1862) recognised the last condition wherein an incapacitating increased tension occurred without any inflammatory symptoms as simple glaucoma. Thereafter it became generally accepted that two main types of disease existed, primary glaucoma occurring without other obvious diseases of eye, secondary glaucoma occurring as a result of other ocular diseases, as well as congenital glaucoma. For many years the standard classification of primary glaucoma embraced two categories: chronic simple and congestive; the later being divided in to two phases, acute and chronic. The ultimate stage of both is known as absolute glaucoma. Barkan (1938) established

the concept of acute glaucoma as being anatomically determined by pupillary blockage and closure of drainage angle and suggested the terms wide-angle and narrow-angle, or subsequently, open-angle and close-angle glaucoma. Gradle (1924-46) divided closed angle type into four stages:

1. Pre- glaucoma: Here the angle is narrow, although allowing adequate drainage, potentially leads to attacks of raised tension or intermittent attacks.
2. Intermittent: Periodic transient attacks of raised tension which causes no organic or functional damage
3. Acute: Acute phase of raised tension
4. Chronic: Closed angle glaucoma wherein the drainage is permanently blocked by peripheral anterior synechiae.

Glaucoma was classified by in the International Symposium on Glaucoma in 1954 (Duke-Elder, 1955) into three types:

A) Primary Glaucoma – not due to obvious disease in the eye.

1. Simple Glaucoma
2. Closed Angle Glaucoma, which has four phases:
    - Pre- Glaucoma
    - Intermittent

- Acute
- Chronic

B) Secondary Glaucoma – due to pre-existing ocular disease; it may be either of open or closed angle type.

C) Congenital Glaucoma (Buphthalmos) due to obstruction of drainage by congenital anomalies.

The primary and secondary glaucoma are differentiated on the basis of presence or absence of the associated factors contributing to the pressure rise. These primary and secondary glaucoma are further sub classified as open angle and angle closure type depending upon the status of the anterior chamber angle.

Cases exist wherein the typical changes at optic disc and defects in visual field occur, while there is no rise in intra ocular pressure and no diurnal variation of intra ocular pressure nor can be raised by provocative tests when account is taken of ocular rigidity. These cases have been termed low-tension glaucoma or pseudo-glaucoma by de Wecker (1896). These changes are usually due to ischemia of optic nerve caused by vascular insufficiency. By the middle of 20th century, the existence of low

tension Glaucoma was firmly established and is now widely known as Normal Tension Glaucoma.

With emergence of normal tension glaucoma, the term glaucoma is now defined as a progressive Optic neuropathy which results from specific pathophysiological changes in the Retinal ganglion cell axons or Optic nerve fibres causing a characteristic structural changes in the Optic nerve head and the functional changes in the visual field which may or may not be associated with the rise in the intra ocular pressure.

Glaucoma accounts for 2% of blindness in India, out of which half are of open angle type. The elevation of the intra ocular pressure in open angle glaucoma is due to the obstruction of aqueous outflow caused mainly by the alteration in the trabecular meshwork. Other mechanism include collapse of Schlemm`s canal, alteration in the intrascleral channels or influence of aqueous humour. This rise in the intra ocular pressure causes damage to the Retinal ganglion cell axons or Optic nerve fibres and subsequently blindness.

Elevated intraocular pressure is the most treatable risk factor for glaucoma. The finding that the relative low intraocular pressure

targets can slow or halt the progression of glaucoma is significant because the ultimate goal of glaucoma therapy is to minimize the visual loss it inflicts. Accordingly, the principal goal of glaucoma management is to reduce intraocular. Increasingly, this knowledge is leading to the setting of target pressure that is individualised to each patient as progression in glaucoma, often occurs at what are sought to be physiological pressures. The target pressure is determined by initial intraocular pressure level when the diagnosis was made, the degree of optic nerve damage, and the general health of the patient. The lower the initial intraocular pressure, the older the patient, the more advance the optic nerve damage, and the presence of cardiovascular disease or diabetes, the lower the target pressure must be set. This is most often achieved pharmacologically by decreasing the aqueous humor production and /or by increasing aqueous outflow; and can also be attained by various surgeries.

In olden days the medical treatment of simple glaucoma was confined to the chronic and absolute phase of the disease when the therapies consisted of bathing the eyes with vegetable derivatives. In second half of the 19th century almost

simultaneously Adolf Weber (1876) advocated the use of the extract of Jaborandi (Pilocarpine) and Ludwig Lacquer (1876-77) of Calabar bean (Physostigmine, Esrine). By the middle of the 20th century, many cholinergic drugs and cholinesterase inhibitors have been synthesized so that today the wide range of miotics have been introduced in to the pharmacological armamentarium.

Darier (1900) started the use of sympathomimetic drugs as an ocular hypertensive agent by treating the glaucoma patients with subconjunctival injections of epinephrine. Hamburger (1923-24) used epinephrine topically to reduce intraocular pressure. Sympatholytic drugs were introduced with the compound of Ergot by Thiel in 1924.

Cantonnet (1904) started osmotic therapy by administrating sodium chloride by mouth, later by Hertel (1913-15) who gave intravenous injection of saline. This technique was followed by the use of more effective substances such as Sorbitol or Urea intravenously or glycerol by mouth. Becker (1945) used carbonic anhydrase inhibitors initially acetazolamide.

Phillips and co-workers (1976) reported that an intravenous injection of Propranolol, a □-adrenergic antagonist lowered intra

ocular pressure in humans. With in a short time Cote g. Drance SM (1968) & Ohrstrom A (1973) found that oral, and Bucci MG (1968) & Weinstein P found that topical Propranolol also reduced intraocular pressure. Later on Katz (1976), Vareilles (1977), Zimmerman and Kaufman (1977) established Timolol Maleate a□-adrenergic antagonist as an effective therapy for glaucoma. Additional topical□-adrenergic antagonist agents as Betaxolol, Levobunolol, Metipranolol, Carteolol, and Timolol hemihydrate have been subsequently added to the armamentarium.

The experimental observations showed that topical prostaglandins produced first an increase, and later a profound decrease in intraocular pressure, and because of clinical observation that the intraocular inflammation was accompanied by low intraocular pressure (Starr MS, 1971), work begin to determine if one or more of the prostaglandins might be of value in glaucoma. Camras and Bito (1981) produced a reduction in intra ocular pressure in monkey eyes lasting up to three days with use of relatively high topical dose of prostaglandin F_2 (PGF_2). The first usable prostaglandin was developed in Japan. Isopropyl Unoprostone (Rescula) is a prodrug that is derived from a pulmonary metabolite

of PGF_2 lowers intraocular pressure in dose dependent fashion with twice daily dosing, and is well tolerated (Takase M, 1992). Later on A. Alm (1993), Y. Hotehana (1993), S. Nagasubramanian (1993) established Latanoprost (PHXA41) a PGF2 agonist as one of the most potent intra ocular pressure lowering agent available today.

Very recently a new molecule known as Prostamide was discovered, which is derived from anandamide – a naturally occurring cell membrane lipid. In 1999 it was found to be potent and highly efficacious ocular hypotensive agent (Woodward DF, Krauss AH-P, Chen J – 2001; Brubaker RF, Schoeff EO, Nau CB – 2001). The intraocular lowering effect exerted by Prostamide is achieved by enhancement of aqueous humor outflow through both the trabecular meshwork and uveoscleral routes. A synthetic Prostamide analog, Bimatoprost was synthesised that selectively mimics its ocular hypotensive effects and is used as a 0.03% ophthalmic solution to reduce intraocular pressure in patients with glaucoma or ocular hypertension.

Surgical procedures devised for the relief of glaucoma should ideally be such as to preserve the visual functions of the

eye, maintain its tension within normal limits, and retain the integrity of the globe. The number of operations advocated from time to time is evidence that this ideal has not been attained till date.

First surgical procedure for glaucoma was suggested by William Mackenzie in 1830. He suggested Sclerotomy and Paracentesis as surgical treatment for chronic stage of glaucoma. A Paracentesis was a temporary expedient; the first to attempt to make it permanent was Gorge Critchett (1857), who in his operation of iridodesis, drew a piece of iris with a blunt hook into the wound made at the limbus for a Paracentesis , thus introducing the idea of drainage by an iris inclusion.

Albert Von Graefe (1857), observing the recession of staphyloma after an Iridectomy presumably owing to the relief of raised tension, announced the effect of a basal iridectomy in the treatment of acute glaucoma but, while the effect in this type of disease was acclaimed to be revolutionary and dramatic, equally good results were found to be absent in the more chronic forms unless, the iris was incarcerated in the scar (Coccius, 1859-63; Baber, 1881; Parinaud, 1901).

Louis De Wecker (1868-71) devised anterior sclerotomy with a view to increase the drainage of aqueous by formation of a filtering cicatrices. In this procedure, after a puncture and counter puncture had been made just behind the limbus, the knife cuts in a short distance as in making an incision for cataract and then was slowly withdrawn leaving the upper pole of the limbus uncut. The operation was practised by Stellwag Von Carion (1870) and Quaglino (1871) and at a later date was improved by de Wecker (1894) himself by making a dialysis in addition and subsequently combining it with iridectomy (1901); but the results remained unsatisfactory for the wound tend to close even although the operation was followed by a prolonged massage (Dianoux, 1905).

Major H. Herbert of Bombay in 1903 devised Small Flat Sclerotomy. In which a small incision was made into the anterior chamber through the sclera behind and parallel to the limbus and at the either end two cuts were made perpendicular to the corneal margin thus leaving a rectangular trap-door of sclera with its base attached to the cornea. In the operation he deliberately induced a prolapse of iris protracted by a flap of conjunctiva in the scar. In a later suggestion, the wedge resection of Herbert (1913), he

isolated a wedge of sclera at the limbus attached to conjunctiva only so that it shrivelled, a technique further amplified by Cruise (1921-47).

Soren Holth (1907) popularised the iris inclusion in his technique known as iridencleisis. In this operation, under a conjunctival flap reflected to the limbus, anterior chamber is opened by a keratome which enters the sclera 2 mm behind the limbus and is directed towards the filtering angle. The scleral lip of the section is depressed so that the iris prolapses in the wound; this tissue is then cut in the 12 o' clock meridian from the margin of pupil to its root; the nasal pillar is drawn outwards over the sclera; the temporal pillar is reposed; and the conjunctival flap sutured. Subsequent massage of the eye is usually considered necessary to ensure a continuous drainage because of the tendency to cicatrisation. L. and R. Weekers (1948) modified it by prolapsing the iris and then tearing it with iris forceps. Troutman (1954) demonstrated that the inclusion of two pillars of iris in the scleral wound was more effective than the one pillar, the former procedure being successful in 90% and later in 69% of cases. The

main complications of this procedure were sympathetic ophthalmitis and late infections.

The production of a filtering scar by sclerectomy was another expedient adopted to secure drainage. This idea was first introduced by Douglas Argyll Robertson (1876) of Edinburgh in his technique of posterior trephining. He trephined at the junction of pars plana and ciliary body, reported 4 cases with reasonably satisfactory results. This idea of draining the suprachoroidal space was pursed by Freeland Fregus (1909-15), who improved upon it by introducing a spatula through the opening into the anterior chamber thus combining trephining with Cyclodialysis. Colonel Robert Henry Eliot (1902-32) of Madras revolutionised this idea by introducing corneo scleral trephining at the limbus. Sclerostomy was further pursued by French surgeon, Felix Lagrange (1906-7), who finally achieved de Wrecker's inspiration of establishing a filtering scar of permanent nature. Later the fashioning of similar type of drainage scar by cauterizing the sclera was sought by Count Luigi Preziosi (1924) and was further elaborated by Harold Scheie in 1958 who introduced cauterization of Sclera with

peripheral iridotomy, known as thermal sclerostomy or Scheie Procedure.

Another type of operation depends on the establishment of drainage channels with in the eye. Such a procedure is done incidentally in other techniques and was first conceived by Leopold Heine (1905) as a primary operation in his technique of cyclodialysis. As with other filtering operations, attempts have been made to maintain the patency of cyclodialysis cleft by the introduction of foreign materials, initially by Row (1934).

With reasoning that Glaucoma was caused by a failure of the aqueous to reach Schlemm's canal, Italian surgeon de Vincentiis (1893) conceived the idea of opening the canal by a knife introduced in to the anterior chamber known as trabeculotomy. His attempt was unsuccessful because he could not see where he was going. This feat was achieved by Otto Barkan (1936-38); he with an aid of contact glass and intense transilluminator devised a technique by which the canal can be cut open from within.

Synthetic devices or Setons are used in Glaucoma Surgery to maintain patent drainage fistula. Rollet (1907) used Horse hair, Bock (1950) used Glass tube, Qadeer (1954) used Acrylic Plates,

Epstein (1959) and others used Polythene tubes and Ellis (1960) used silicone tubes. In 1969 Molteno established the idea of connecting a tube from anterior chamber to a drainage field provided by an acrylic plate (Molteno, 1969-68). Later it was modified by Schocket and Co-workers by shunting the aqueous via tube to encircling band (1982-86). Then came the Ahmed valve which has a valve feature that restricts flow of aqueous below 7mm of Hg, helping to minimize postoperative hypotony. It is a single plate design that avoids multiquardant surgery and involvement of extraocular muscles (Prata JA Jr and others, 1995). Clinical experience with Ahmed valve has produced pressure lowering results that are similar to other implantation devices; postoperative complications associated with over filtration appear to occur less frequently with Ahmed valve implants than with most alternatives (Coleman AL and others, 1995). Complications of drainage implants includes erosion of the tube and plates, cataract formation, corneal decompensation caused by endothelium-tube contact, hypotony with all its accompanying problem (including suprachoroidal haemorrhage), and blockage of either end of the tube by ocular contents in the anterior chamber or fibrosis at the

bleb end. Endophthalmitis and phthisis bulbi though rare, can be seen. So these devices are not appropriate for initial surgery in uncomplicated primary open angle glaucoma, but their risk is reasonable in more severe cases as neovascular glaucoma, aphakic glaucoma, and advanced developmental glaucoma (Ancker E, Molteno AC – 1980; Brown RD, Cairns JE – 1983).

Various destructive procedures are also done on the ciliary body. Following the observation of Weve (1932) that extensive surface diathermy on ciliary body frequently resulted in ocular hypotension, Vogt (1936) proposed the operation of penetrating cyclodiathermy for various forms of glaucoma. Because of frequent postoperative complications, he modified his technique to partial penetrating cyclodiathermy (Vogt, 1937-39), while others have suggested that nonpenetrating is just as effective with fewer complications. Cyclodiathermy acts by reducing the formation of aqueous (R. Weekers and Prijot, 1952; Scheie et al., 1955) and on histological examination partial atrophy of ciliary body has been shown to occur in some cases (Scheie et al., 1955). Next came the cyclocryosurgery, in which the application of low temperature to the region of ciliary body also results in a reduction of ocular

tension, and this form of cryosurgery is remarkably free from complications (Bietti, 1947-50; Krwawicz and Szware, 1965; de Roetth, 1966; Haye et al., 1967). With the advent of laser cyclophotocoagulation procedures came in to being, to destroy elements of the ciliary body. Cyclophotocoagulation tends to have fewer complications than dose cyclocryodestruction (Suzuki Y and others, 1991), but most glaucoma specialists do not attempt cyclophotocoagulation until other attempts at intraocular pressure reduction have failed.

Cairns in 1968 introduced modern day trabeculectomy. It was initially believed that the aqueous escapes through the cut ends of Schlemm's canal but it subsequently became obvious that the major effect of the surgery occurred through via filtration of aqueous through the subconjunctival space (Spencer 1972). This operation possibly avoided shallow or flat anterior chamber post operatively which was a major problem with unguarded filtering surgeries. Trabeculectomy has now become the standard glaucoma procedure, with excellent results for most forms of open angle and chronic angle closure glaucoma. Aphakic, inflammatory, traumatic, and other secondary forms of uncontrolled glaucoma

also are treated with trabeculectomy; success rates are good when wound healing retardants or wound modulators as 5 Fluorouracil and Mitomycin-C were used in Trabeculectomy (Chen CW and others, 1990; Lamping KA, Belkin JK – 1995; Prata JA Jr. and others, 1995).

When the filtering Sclerostomy is protected from excessive flow either by partially closing it with scleral flap or by suturing techniques, it is described in terms such as guarded, protected sub-scleral, or partial thickness filtering surgery. The advantage of such techniques is that the initial egress of aqueous from the anterior chamber is retarded, which reduces the incidence of postoperative flat chambers (Wilson MR, 1989). This decrease in incidence of postoperative hypotony and flat chamber appears to reduce inflammation, peripheral anterior synechiae, and cataract formation as well. Guarded filtration procedures may also reduce the long term success rate of surgery and prevent attainment of the very low pressure that seems desirable in advanced glaucoma or normal tension glaucoma (Lamping KA and others, 1986).

Procedures such as thermal sclerostomy, posterior or anterior lip sclerectomy, or Elliott's trephination has no guard over

the external surface of sclerostomy other than conjunctiva and tenon's capsule. These procedures are labelled as full thickness filtration surgery. Such procedures may be preferable if very low pressures are desirable as in normal tension glaucoma or if guarded filtering surgery has failed (Papst w. Brunke R, 1980).

External filtration surgery achieves reasonable intraocular pressure lowering in 65% to 85% of adults, depending upon the condition of the eye, the use of antimetabolites, the healing tendencies of the eye, and the skill with which the surgery is performed. This success rate may be increased to over 90% if eyes in which antiglaucoma medication use was resumed was included.

It is difficult to compare surgical results because of variation of techniques and definitions of success. In a prospective, randomised study of the difference between thermal sclerostomy and trabeculectomy, Blondeau and Phelps (1981) reported intraocular pressures less than 22 mm of Hg in 65% of thermal sclerostomies and 76% of trabeculectomies followed up for 5 years. When medications were added, the success rate rose to 91% of the eyes treated with thermal sclerostomy and 94% of

those treated with trabeculectomy. Pressure tends to be somewhat lower in eyes undergoing thermal sclerostomy, but visually significant cataracts occurred three times more often and hypotony twice as often with thermal sclerostomy (Blondeau and Phelps, 1981). Thinner blebs were more frequent with thermal sclerostomy. Even eyes with no detectable bleb at 5 years (approximately 1/3 of the total), however had intraocular pressures of 17 mm Hg.

In another retrospective study of comparison of full thickness filtration versus trabeculectomy, Lamping KA and others (1986) found that the former offered much better long term pressure control. They noted an equal frequency of problems with hypotony with guarded and full thickness procedures.

In various studies on eyes with open angle glaucoma, which were treated trabeculectomy, pressure level of 21 mm of Hg or lower with or without medication are achieved in 80% to 90% of eyes (Spaeth GL, 1980; Lewis RA, Phelps CD – 1984; Sharma SL, Singh T – 1981; Shields MB, 1980; Spaeth GL, Poryzees – 1981; Watkins PH Jr, Brubaker RF – 1978).

The experience with trabeculectomy with a scleral flap, with or without use of low concentration of antimetabolites and releasable sutures is quit good. But there are complications associated with it as:

1. Hypotony and flat anterior chamber (Spaeth GL – 1990; Migdal C, Hitchings R – 1988; Burney EN, Quigley HA, Robin AL – 1987)
2. Uveitis and Hyphema (Lundy DC – 1996; WuDunn D – 1997)
3. Hypotonus Maculopathy (Dellaport A – 1955; Gass J – 1972; Altan T – 1994)
4. Dellen (Mai G, Yang S – 1991)
5. Blebitis (Ciulla TA – 1997; Chen PP – 1997; Brown RH – 1994)
6. Endophthalmitis (Kangas TA – 1997; Dhaliwal R, Meredith T – 1995)
7. Cataract (Blondeau and Phelps, 1981)
8. Late complications such as failure of filtration, conjunctival scaring, over drainage of Filtering Bleb, spontaneous

Hyphema, Ciliochoroidal detachment (Stamper RL, Liberman MF, Drakes MV – 1999).

Most of these complications occur due to conjunctival blebs and anterior chamber entry.

G.L. Skuta R.K. Panish 1987 have studied wound healing in glaucoma filtering surgery and have reported that failure of filtration surgery is. In most cases caused by fibroblast proliferation, collagen synthesis , deposition of glycosaminoglycans and eventual subconjunctival fibrosis resulting in bleb disappearance.

J.A. Alvarado 1998 reported that failure is considered to be triggered by proliferation of fibroblasis form all tissues surrounding the fistula but vascularised soft connective tissues contribute more to the fibrotic response than do the poorly vascularised hard connective tissues such as sclera.

Kimbrough R.L. et al 1982 observed that the shape of scleral flap i.e. square/ triangular scleral flap is not associated with a difference in success rate but square flap has a greater chance of scarring down while the triangular shape combination of 5-FU

reduced the complications much more compare to square flap shape.

L.M. Balashova et al (1992) , observed that triangular scleral flap with MMC in trabeculectomy surgery lowered the intraocular pressure and reduces the post operation complications.

Dr. Peter Netland and Dr. David Lee (2001), observed that square scleral flap surgery remaind the Gold standard for glaucoma filtering surgery for lowering intraocular pressure and reduces post operative complications.

In December (2000) Detry Morel M. had done a study on square scleral flap and triangular scleral flap with 5-FU on 48 patients and was found that the square scleral flap technique with 5-FU is much more better than triangular scleral flap with 5-FU regarding intraocular pressure and post operation complications.

The use of antifibrotic agent such as 5-FU in conjunction with trabeculectomy to limit fibroblast proliferation at the filtering site has been advocated to improve success. 5-FU which inhibits fibroblast proliferation by acting selectively on the 'S' (Synthesis) phase of the cell cycle(S-phase specific) has received the greatest attention until recently. 5-FU to enzymatically converted to the

nucleotide, 5-Fluoro 2- deoxyuridylate monophosphate 5-FdUMP , this competitively inhibits thymidylate synthesis, which catalyzes the conversion of deoxiuridine phosphate to thymidine phosphate and affects DNA synthesis. 5-FU may be converted to its corresponding ribophosphate, which is incorporated into RNA. Defective protein synthesis results from altered translation from mRNA and abnormal ribosomes.

The ideal patients for use of 5-FU in trabeculectomy is young patient between 40 to 55 years old, eyes with previous failed trabeculectomy, aphakic, pseudophakic and eyes with neovascular glaucoma or active iridocyclitis. In addition 5-FU has been beneficial at the time of initial surgery in phakic eye with open angle glaucoma.

Cunliffe IA. Longestaff S. (1993), Lanigan L. et al (1934), Smith MF et al. (1992) observed that 5-FU intraoperatively increase success rate decreased the postoperative intraocular pressure and reduces the need for postoperative antiglaucoma medications in square/triangular scleral flap in trabeculectomy surgery but 5-FU is comparatively less effective than MMC to developing successful filtering flap and has less serious side effects.

MATERIAL & METHODS

MATERIAL AND METHODS

The present study was conducted in the Post Graduate Department of Ophthalmology M.L.B. Medical College Jhansi to evaluate the comparative study of square / triangular scleral flap in trabeculectomy along with 5-FU.

All the patients of primary open angle glaucoma included in this study were selected from the out patient department of M.L.B. Medical College, Jhansi.

The patients selected were divided in two groups, Group A and Group B on the basis of scleral flap.

Group A was described as a square scleral flap with 5-FU.

Group B was described as triangular scleral flap with 5-FU.

Every selected patient was examined and investigated on the following lines:-

I. Identification of the patient: -

Following particular were recorded: - Name, Age, Sex, Address and Occupation. Then every patients was allotted a patient code

HISTORY OF PRESENT ILLNESS:

History of diminution of vision , its rate of progression, any history of headache and eye pain , its severity , duration and association with vomiting, coloured halos, redness, discharge and watering of eye was inquired and recorded . History of antigalaucoma therapy as well as any other ocular therapy was asked and recorded.

PAST HISTORY:

Past history regarding previous ocular diseases and their treatment was asked and noted. History of ocular trauma or other visual disturbances was taken. History of diabetes, hypertension and tuberculosis is also inquired and noted.

PERSONAL HISTORY:-

History of smoking, tobacco chewing, and addiction to alcohol or drug is taken. Inquiry is also made about cough, constipation and straining while micturation.

EXAMINATION:

GENERAL EXAMINATION-

Recording of pulse, temperature, respiratory rate and blood pressure was done and noted.

SYSTEMICEXAMINATION:

Examination of Cardio vascular system, Central Nervous System, Respiratory System and G.I. tract was done.

LOCAL EXAMINATION (EYE EXAMINATION)-

The local examination was done under bright illumination to examine the conjunctiva, cornea, anterior chamber, iris, pupil and lens.

The slit lamp examination was done routinely particularly to examine the transparency of cornea, aqueous flare, keratic precipitates, extent of lenticular opacities, and pigment dispersion over the lens and to elicit pupillary reaction in doubtful cases.

SPECIAL EXAMINATION:

1. **Visual Acuity-**

Best corrected visual acuity recorded preoperatively in terms of Snellen's test type, finger counting, and hand movement, perception of light and projection of rays depending upon the individual's visual status.

2. Pupillary Examination-

Pupils of both eyes were examined with the help of slit lamp for:-

- Pupillary reaction
- Size of pupil
- Shape of pupil
- Presence of any synechiae

3. Fundus examination-

This was done with Welch Allyn direct ophthalmoscope, Keeler's indirect ophthalmoscope and 90 D lens. The condition of optic disc such as size, shape, colour, margins, cup- disc ratio, nasal shifting of vessels ,neuroretinal rim and parapapillary area was noted and if possible photographed with funds camera. Besides this any other abnormality in funds was also recorded.

4. Gonioscopy-

It was done cooperative patients by Goldman's three mirror gonioscope to access the angle status whether open or closed. Beside these the peripheral anterior

synechiae and neovascularisation of the angle, if any were noted.

5. Field Charting –

Field charting was done pre operatively in cooperative patients with good vision. Peripheral field charting was done with the Goldman's perimeter and central field with Bjerrum's screen.

6. Tonometery-

Tonometery was performed with Schiotz's tonometer, with a standard technique in all cases. One particular Schiotz's tonometer was used pre and post operatively.

Post operatively intra ocular pressure was recorded 2^{nd} day , 10^{th} day, 6^{th} week, 3^{rd} month, 6^{th} month.

Every patient was subjected preoperatively to investigations like: -

- Routine blood Examination
- Routine urine Examination
- Blood sugar - Fasting
  -PP

- Conjunctival smear Examination
- Syringing of nasolacrimal passage
- Xylocaine sensitivity test.

Preoperative Medications:

Preoperative effective control of intraocular pressure was obtained by minimum Medical therapy including acetazolamide, Ciprofloxacin eye drops four times daily for 3 days preoperatively given to every patient informed written consent was taken from all the patients, prior to surgery.

Anaesthesia:

Peribulbar or Retro bulbar anaesthesia by a combination of 2% xylocaine and 0.5% Adrenaline, (never should give the pinky ball).

Operative techniques:

A wire speculum was inserted to separate the lid or bride suture were applied to avoid any pressure on the globe. External pressure on the globe when the eyes open can make maintenance of the anterior chamber difficult the lashes should be out of the surgical exposure.

The superior rectous traction suture allows rotation of the globe inferiorly to bring the superior bulbar conjunctiva in to view. The suture is then clipped to the drape, keeping the globe in a fixed position.

Conjunctival flap was made either limbus or fornix based, but a limbus based flap seems to produce a more localized and elevated bleb and a fornix based flap is a more diffuse and flatter one. In limbus based flap the incision was extended superiorly 8 mm from and parallel to limbus. In fornix based flap 6 mm conjunctiva was dissected at limbus so clearly expose the sclera and limbus. Any bleeding vessel was cauterized.

Sclera flap was made either square or triangular. The square flap was made 3X3 mm with the help of a blade knife mounted on a B.P. handle and the triangular square flap was 3.5X3.5X3.5 mm .A half thickness square or triangular flap of sclera was dissected towards the cornea with the help of blade knife and 0.12 mm toothed forcip. The flap was extended forwards untill the anterior 1 mm of its bed consist of cornea.

Then a fluid retaining sponge is fashioned to approximately 2 to 3 mm long and wide and about 0.5 mm thick would be

soaked in 1ml of 50 mg undiluted 5-FU placed on the between sclera flap and the sponge will be left in position for two minutes. The sponge had removed and would be irrigated with 20 ml of balanced salt solution or from Ringer lactate.

Along the line of scleral spur thus defined about 2mm behind the corneolimbal junction a 3mm long radial incision was made on one side immediately by a sharp micro blade. This radial incision was started in clear cornea and extended posteriorly to the blue – white transitional jone, the site of schwalbe's line. A similar size radial incision was made on the another side. (The incision should not be made too far posteriorly because blockage of the trabeculectomy site by iris or ciliary process may lead to post operative failure.) The anterior lip of incision was grasped with a fine-toothed forcep and a block sized 3X1 mm of limbus tissue was excised. A broad peripheral iridectomy was performed which help avoid iris incarceration into the internal sclerostomy. The iris was repository back with help of iris repositor. Air was infected with a 30 gauge blunt canula to reformation of the anterior chamber. The corneo -Scleral flap was then approximated back to the scleral bed and sutured with

10/0 nylon interupted suture. The limbus based conjunctival flap was closed with 10/0 nylon suture continuously and the fornix based conjunctival flap was sutured both ends through partial thickness sclera and the conjunctival flap margin.

A subconjunctival injection of 0.5 ml of gentamycin and 0.5 dexamethasone was given. A short-term mydriatics like tropicamide along with antibiotic-steroid eye ointment. Eye pad was applied and bandage was done.

During the intra operative period conjunctival biopsy specimen were obtained from all patients. Only patients who has primary open angle glaucoma with no history of previous ocular surgery or significant ophthalmic or systemic disease were included the study. None of the patient has received topical or systemic steroids prior to surgery.

Post Operative Care:

All patients received topical 0.1% dexamethason, atleast six times a day a minimum of 6 weeks and antibiotic eye drop four times a day for 4 to 6 weeks. Oral antibiotic and anti-inflammatory analgesics were also given for 5 days.

Post Operative Follow-up:

Each patient was subjected to a detailed eye examination at:-

1. On 2nd day of operation
2. On 10th day of operation
3. After 6th week of operation
4. After 3rd month of operation
5. After 6th months of operation

When clinically indicated patients were seen more frequently. All patients turned up for first 4 follow up visits of these patients intraocular pressure of their 3rd visit was taken into consideration.

Surgical Success:

Surgical success was defined as an intraocular pressure of 21mm Hg or less without any complication and failure was defined as an intraocular pressure greater then 21mm Hg with or without other ocular complications. Optic disc visual field and visual acuity criteria for success were not analysed, so that out come of trabeculectomy was assessed on the to criteria i.e. intraocular pressure control and post operative ocular complications.

OBSERVATIONS

OBSERVATION

The present study was conducted in the post graduate Department of Ophthalmology M.L.B. Medical College, Jhansi on 36 eyes of 36 patients of primary open angle glaucoma.

The patients selected were divided in two groups, Group A and Group B on the basis of scleral flap.

Group A was described as a square scleral flap with 5-FU.

Group B was described as triangular scleral flap with 5-FU.

Table -1

Distribution of cases according to sex in group A and B

Group	sex				Total	
	Male		Female			
	No	%	No	%	No	%
A	11	61.2	07	38.8	18	50
B	10	55.6	08	44.4	18	50
Total	21	58.3	15	41.66	36	100

Table 1 shows Male: Female ratio in group A was higher than group B.

Table -2

Distribution of cases according to age in group A and B

Group	Age in year				Total	Mean	S.D.
	<40	40-50	50-60	60-70			
A	00	02	13	03	18	55.5	5.38
B	01	01	12	04	18	56.6	7.33

Mean age of group A 55.5± 5.38 was less than group B 56.6 ± 7.33.

Table -3

Mean age of the cases according to sex in group A and B

Group	Male			Female			Total		
	No	%	S.D.	No	%	S.D.	No	Mean	S.D
A	11	55	4.4	07	56.4	7.3	18	55.5	5.38
B	10	56	5.6	08	55	9.2	18	56.6	7.35

Table 3 shows further observation of mean age of male (55±4.4) was comparatively less than female (56.4± 7.3) in group A. While the mean age of male (56.±5.6) was greater than female(55±9.2)in group B. Statistically no significant difference was observed in group A and group B regarding the male and female mean age.

Table -4

Mean IOP in mm Hg at initial level and change on 2nd day group A and B.

Group	Initial		Change on 2nd day		Statistical value	
	Mean	S.D.	Mean	S.D.	t	P
A	30.5	3.16	20.7	2.82	4.2	<.01
B	34.6	2.14	23	2.4	4.19	<.01
t	3.41					
P	<.01					

Table 4 shows that the change in intraocular pressure on 2nd day was less in group A (20.7 $\pm$2.82) as compared to group B (23$\pm$2.4).

Table -5

Mean IOP in mm of Hg at initial level and change on 10th day in group A and group B.

Group	Initial		Change on 10th day		Statistical value	
	Mean	S.D.	Mean	S.D.	t	P
A	30.5	3.16	19.8	2.0	7.9	<.01
B	34.6	2.14	21.01	2.8	6.9	<.01
t	3.41		1.4			
P	<.01		>0.05			

Table 5 the change on 10th day was less in group A (19.8±2.0) as compared to group B (21.01±2.8)

Table -6

Mean IOP in mm of Hg at initial level and change on 6th week in group A and group B.

Group	Initial		Change on 6th week		Statistical value	
	Mean	S.D.	Mean	S.D.	t	P
A	30.5	3.16	16.8	2.0	5.3	<.01
B	34.6	2.14	19.3	2.8	5.26	<.01
t	3.41		2.80			
P	<.01		>0.01			

Table -7

Mean IOP in mm of Hg at initial level and change on 3rd month in group A and group B.

Group	Initial		Change on 3rd month		Statistical value	
	Mean	S.D.	Mean	S.D.	t	P
A	30.5	3.16	15.3	1.5	4.2	<.01
B	34.6	2.14	18.3	1.8	4.79	<.01
t	3.41		5.76			
P	<.05		<0.01			

Table -8

Mean IOP in mm of Hg at initial level and change on 6th month in group A and group B.

Group	Initial		Change on 6th month		Statistical value	
	Mean	S.D.	Mean	S.D.	t	P
A	30.5	3.16	14.4	2.9	3.79	<.01
B	34.6	2.14	18.6	2.3	3.65	<.01
t	t=3.41		t=6.2			
P	<.01		<0.01			

Table 6,7,8 the changes after 6 week, 3 month, 6 month were less in group A as compared to group –B which were found to be statistical by significant.

Table -9

Post operative complication (shallow anterior chamber) in group A and B.

Group	Shallow A.C.		Statistical Value	
	Absent	Present	X^2	P
A	16	02	0.78	P>.05
B	14	04		

Their percentage of shallow anterior chamber was observed more in group B as compared to group A it was not statistically significant.

Table -10

Post operative complication (conjunctival bleb failure) in group A and B.

Group	Conj. Bleb. Failure.		Statistical Value	
	Absent	Present	X^2	P
A	18	00		
B	16	02	2.01	>.05

Table -11

Post operative complication (Scleral Flap complication) in group A and group B.

Group	Scleral Flap Complication.		Statistical Value	
	Absent	Present	X^2	P
A	18	00		
B	15	03	3.085	<.05

The scleral flap complication was higher in group B as compared to group a which was statistically significant.

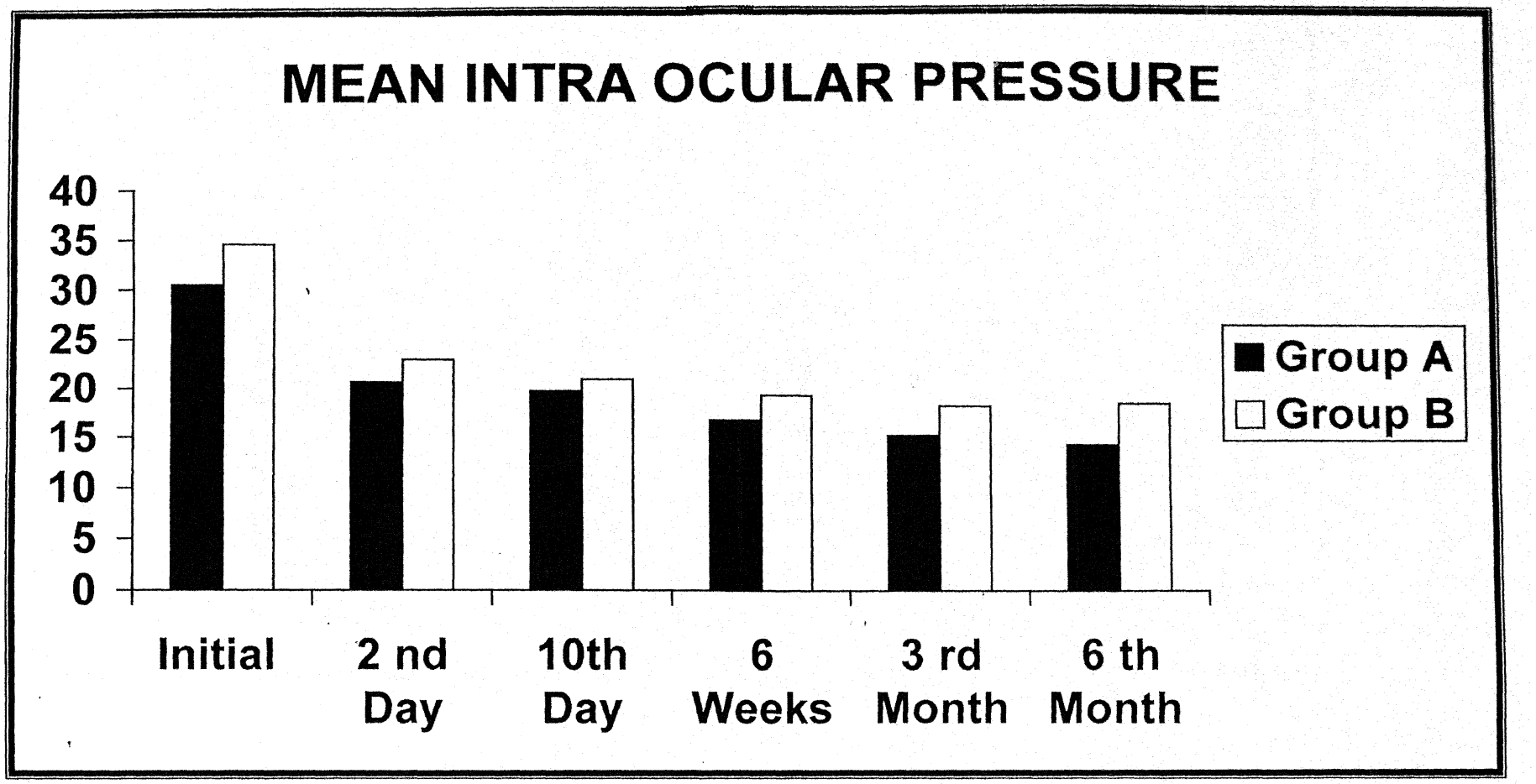
Post operative complication associated with * FU and infection was not seen.

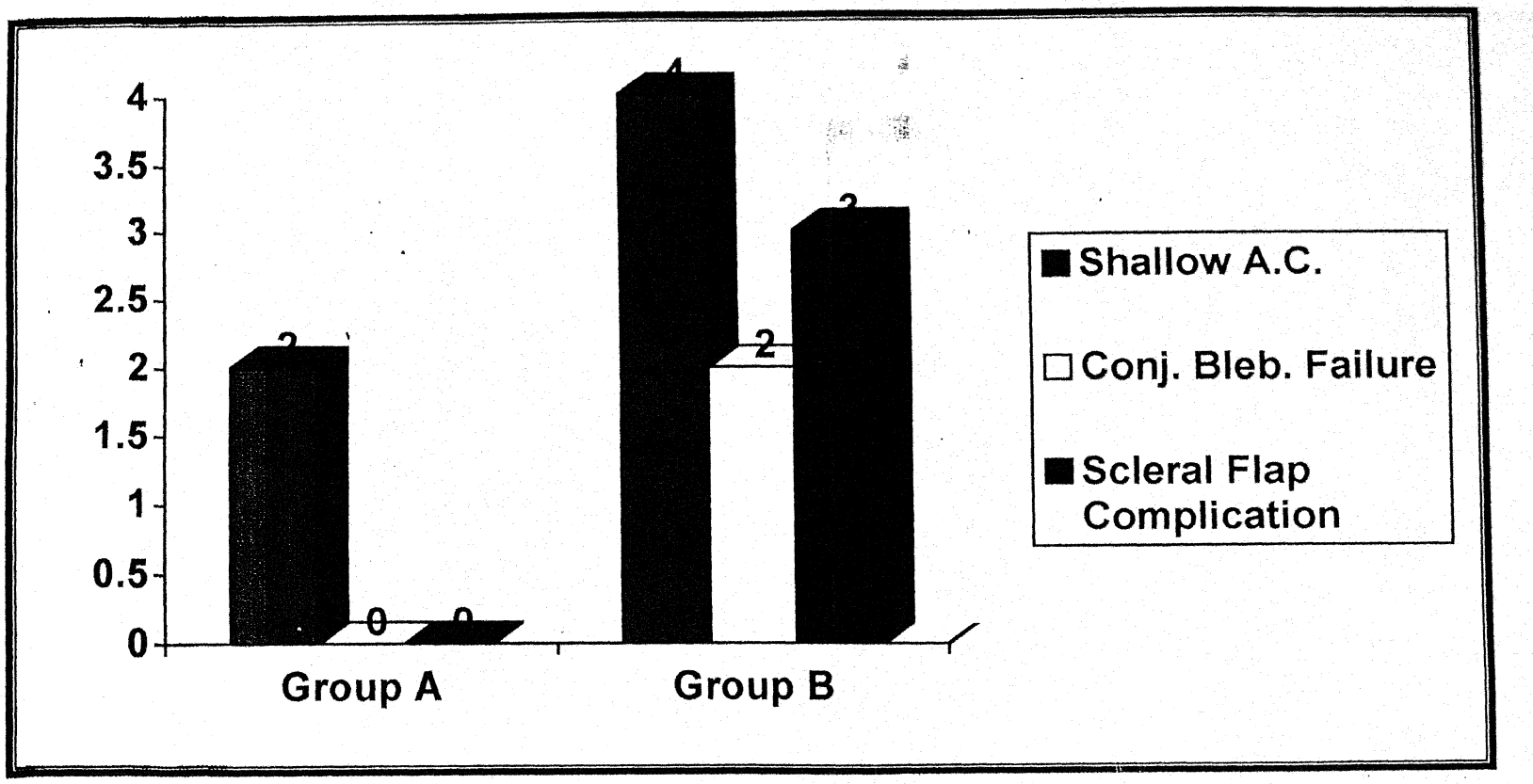
Table- 12

Showing Trabeculectomy Success Rate in Group A and Group B . Regarding intraocular pressure.

Group	No of eye operative	No of Trabeculectomy	Success Rate	Statistical Value	
				Z	P
A	18	17	94.4	1.969	<.05
B	18	14	77.7		

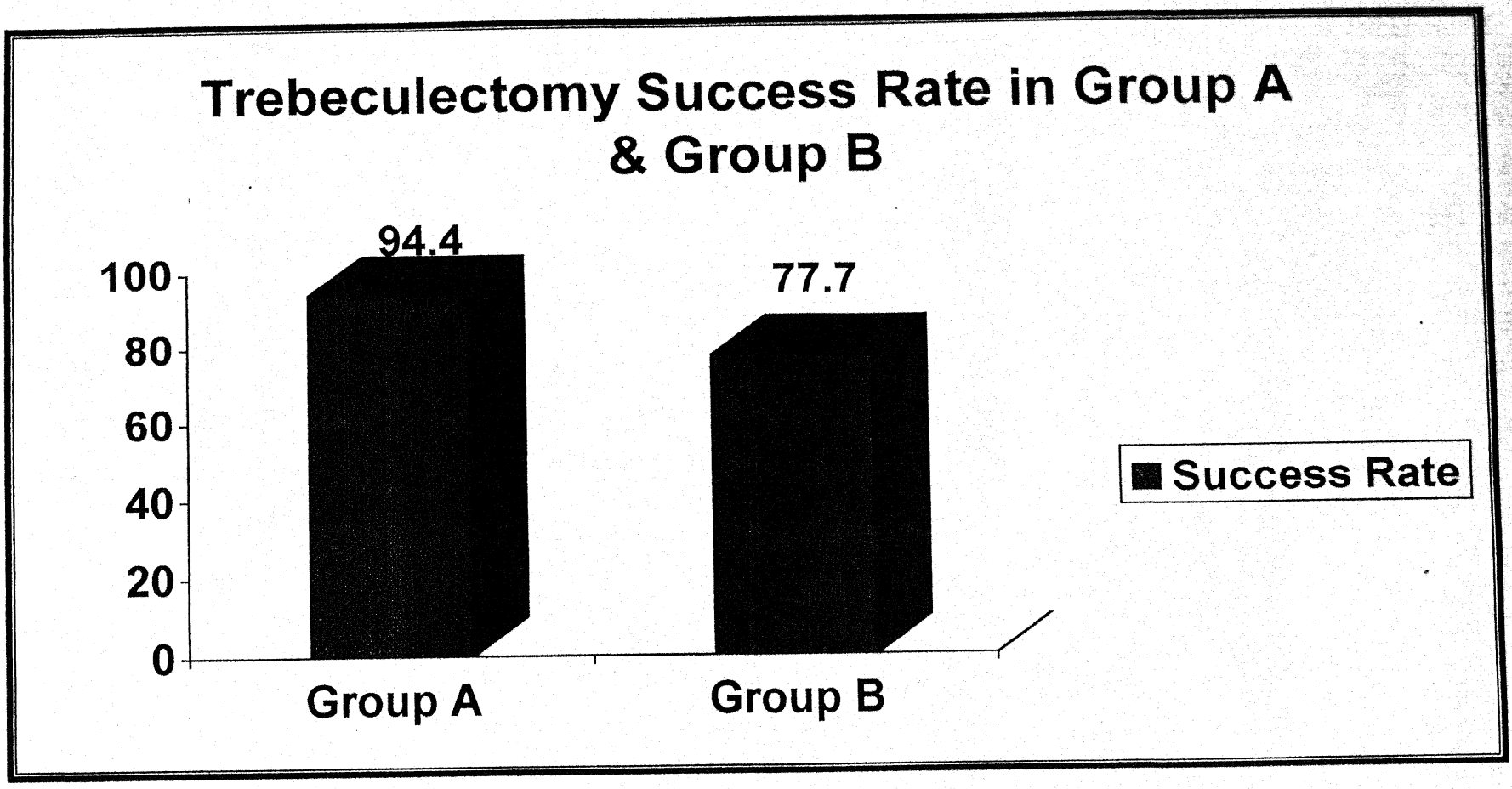
During the study period of 6 month, the success rate was found to be more in group A (94.4) as compared to group B (77.7%) it was statistically significant.


MEAN INTRA OCULAR PRESSURE
40
35
30
25
20
15
10
5
0
Initial
2 nd Day
10th Day
6 Weeks
3 rd Month
6 th Month
Group A
Group B



Group A: Square Scleral flap with 5-FU

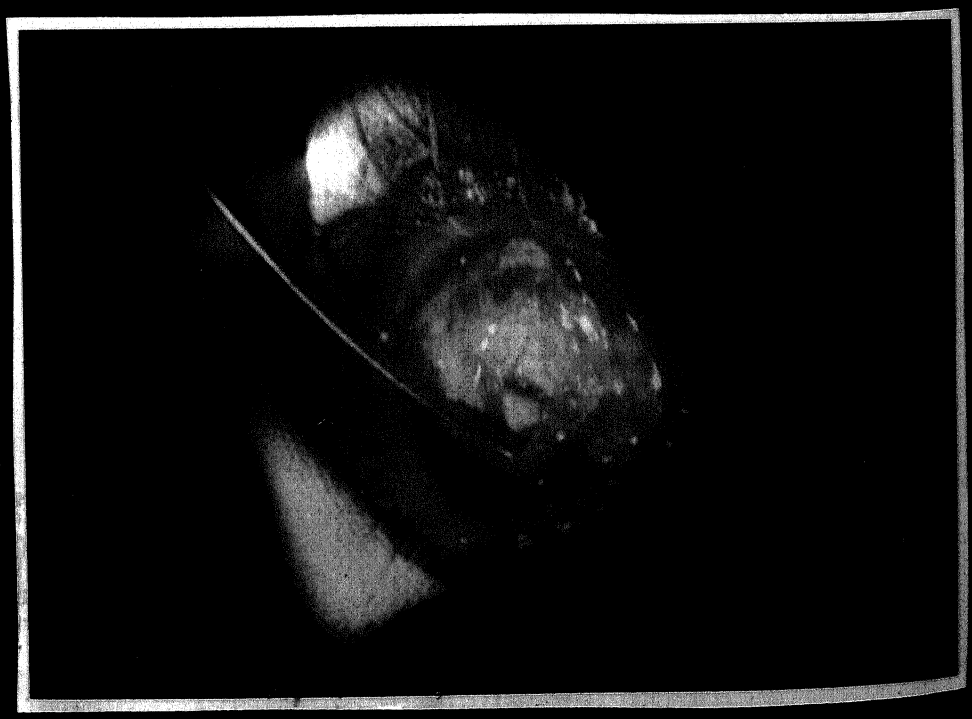
Group B: Triangular Scleral flap with 5-FU



Group A: Square Scleral flap with 5-FU

Group B: Triangular Scleral flap with 5-FU

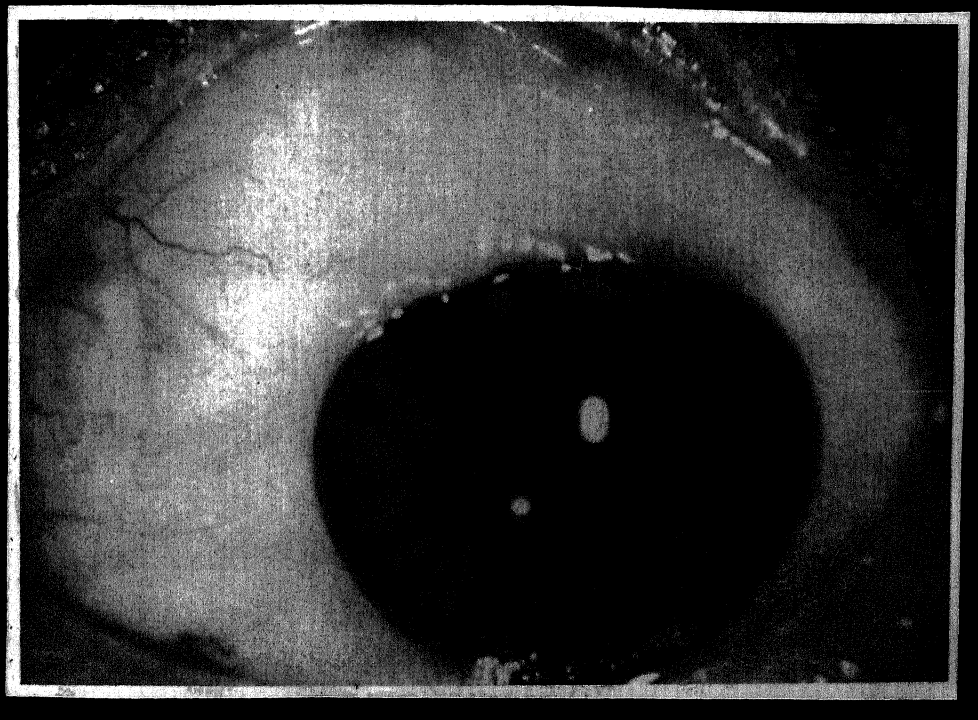
Schiotz Tonometer



Triangular Scleral Flap

Square Scleral Flap

Fluid retaining sponge with 5-Fu b/w scleral flap



Flat Anterior Chamber

DISCUSSION

DISCUSSION

The treatment of chronic simple glaucoma has been a challenge to the ophthalmologist and remains to be a puzzule to the modern ophthalmologist even today.

The present study has been conducted in primary open angle glaucoma cases, "to evaluate comparatively between square / triangular scleral flap in trabeculectomy along with 5-FU" with reference to intraocular pressure changes occur in square and triangular scleral flap ,the success and complications with 5-FU.

EFFECT OF SQUARE AND TRIANGULAR SCLERAL FLAP ON THE TRABECULECTOMY SURGERY WITH 5-FU:

In total 36 eyes of primary open angle glaucoma were studies . Out of these 18 patients belonged to group A (square scleral flap in trabeculectomy with 5-FU) and 18 patients belonged to group B (triangular scleral flap in trabeculectomy with 5-FU).

Table 13: Comparative effectiveness of trabeculectomy surgery regarding the intraocular pressure controlling in group A and Group B.

Group	Eyes Operated	Trabeculectomy Failure	% success	X^2	P
A	18	01	94.4		
B	18	04	77.7	4.11	<0.05

In group A mean intraocular pressure before operation was 30.5±3.16 Hg with a maximum and minimum intraocular pressure of 41.2 mm Hg and 24 mm Hg respectively. Change on 2nd day of operation mean intraocular pressure came down to 20.7±2.82 mm Hg. And subsequently change on 10th day, after 6 weeks, 3 months and 6 months, the intraocular pressure was 19.8±2, 16.8±2,15.3±1.5,14.4±2.9 mm Hg respectively. Thus the success rate was found to be 94.4%.

In group B the mean intraocular pressure before operation was 35.80±Hg . On 2nd day of surgery it came down to 23±2.4 mmHg and subsequently, On 10th day was 21±2.8 after 6 weeks was 19.3±2.8 3rd months was 18.3±1.8 and 6 months was 18.6±2.3. Thus the success rate was found to be 77.7%.

Table -14 Trabeculectomy success rate comparison between group A and Group B.

Groups	Statistical Values		
	X^2	P	Significance
A V/S B	4.11	<0.05	Sig.

Mean intraocular pressure after 6 months of study in group A was 94.4 %and group B was 77.7% which was statistically significant (X^2=4.11, P<0.05).

L.M. Balashova , M.S. Aronskind and A.V.I. Irhina Russian State Medical University, Moscow, Russia has done a study in triangular scleral flap in 1992. They in their study of 24 eyes aged 59 t0 73 years with open angle glaucoma and operated. They made triangular scleral flap of 3.5X3.5X2.5 size. After 3to 6 months follow up period, patients showed 14 t0 22 mm Hg intraocular pressure, 1 patient had Hyphema, 1 case had cyst of the filtration pulvinar which disappeared after a puncture by a thick needle, 2 patients had shallow anterior chamber. The decrease of the visual function was not observed.

The postoperative complication in the present study was shallow anterior chamber in only 4 patients and conjuctival flep

failure in 2 patients , scleral flap complication in 3 patients regarding to Triangular scleral flap.

However their study differed from ours study in following aspects-

- They had studied only in triangular scleral flap.
- They used MMC.

Table -15 : Comparison of Present study with the study conducted by L.M. Balashova regarding to Triangular scleral flap.

Study	Criteria	Total Cases	Success	%
Present Study	Successful Trabeculectomy	18	14	77.7
L.M. Balashova	Successful Trabeculectomy	24	20	83.3

Kimbrough RL et al (1980) observed that the shape of scleral flap (square scleral flap of triangular scleral flap) is not associated with a difference in success rate regarding the intraocular pressure.

In group A post operative complications 2 patient was observed of shallow anterior chamber.

In group B regarding the post operative complications 4 patient had shallow anterior chamber and 2 patient conjunctival bleb failures, and 3 patient has thin scleral flap.

In comparison to group A and group B post operative complications of group B were more than that of group A, which was statistically significant ($P<0.05$).

Menezo J.L. (1976), observed that shape of the scleral flap appears to make no difference in the result but he suggest a very large square flap 5X5 mm. particularly in Aphakia had a good results for reducing intraocular pressure.

A Euswas department of Opthalmology, Ramathibodi Hospital, Faculty of Medicine, Mahidol University, and Bangkok, Thailand had worked on half thickness triangular scleral flap in 2001. He said various types of scleral flaps can be employed including trapezoid, triangular, square or arch shaped but I prefer the triangular flap and out line the area of flap by using gentle bipolar or unipolar cautery. This flap will facilitate and ease dissection of an external scleral flap in controlled manoeuvre".

Dr Binita B, Shelat, Glaucoma Fellow Shankara Netralaya, Chennai and Dr. Ravi Thomas, Schell eye hospital, Christian Medical College Vellore, observed that triangular flap with 5-FU had reduced post operative intraocular pressure and decreased the complications.

Dr Peter Netland Los Angeles California U.S.A. (1998), observed square flap Trabeculectomy in malignant glaucoma. He said, I always used square scleral flap with one suture only, but in this case I would used square scleral flap with 5 suture one on each corner and one on each side of the scleral flap".

Dr Peter Netland Director of Glaucoma and Associate Professor of Ophthalmology at University of Tennessee, Memphis and Dr, David Lee, Chairman, Department of Ophthalmology, Pennstate University Harshey(2001) proposed that square scleral flap surgery remains the GOLD standard for Glaucoma filtering surgery . None penetrating surgery had its proponent, so the majority of USA clinician still performs trabeculectomy by square scleral flap technique.

J. Freedman (1987) also observed that use of square scleral flap to assist in enhancing filtration and prevent complication of filtration surgery.

Detry Morel M. had done a similar study 15th December 2000 which was accepted in 5th April 2001. He had studies on 61 eyes of 48 patents of 64.5±10.5 years mean age group, and mean intraocular pressure (preoperative) was 27.8 ±8.6 mm Hg. A one third limbus based square scleral flap measuring 5X5 mm was dissected and in another cases a deep triangular scleral flap (3.5X3.5X3.5mm) was dissected leaving only a very thin layer of deep sclera over the choroid. A sponge soaked with 5-FU (50 mg/ml) was applied beneath the superficial scleral flap during 3 minutes. Later he observed the mean intraocular pressure was 15.1 ±35 mm Hg in square scleral flap surgery and the post operative complications was 2 within square scleral flap with 5-FU and 9 was within triangular scleral flap with 5-FU .So the success rate of trabeculectomy with square flap with 5-FU was 96.72% and

with triangular scleral flap with 5-FU was 81.52%(P) which had significant difference.

Table – 16

Comparison of present study with the study conducted by Detry Morel M. Regarding to Trabeculectomy success rate.

Study	Criteria	Square scleral Flap with %-FU	Triangular Scleral flap %
Present study	Successful Trabeculectomy	94.4	77.7
Detry Morel M.	Successful Trabeculectomy	96.72	81.25

Table 16 shows the result of Derty Morel M. studied is very much similar to our study.

Thus the result of present study have made a link between the conclusion of Detry MorelM (2000) study that have reported that the square scleral flap with 5-FU is comparatively better that triangular scleral flap with 5-FU by L.M.Balashova, MenezoJ.L.et.al Joseph Caprioll et al , J, Freedeman (1992, 1976, 1998 and 1987) respectively.

SUMMARY

&

CONCLUSION

SUMMARY AND CONCLUSION

Present study was done on 36 eyes of 36 patients of primary open angle glaucoma. All patients were studies in two groups. Group A and Group B. In group A, those patients had studies on them square scleral flap with 5-FU in Group B, studies shows the triangular scleral flap with 5-FU. The mean age of the patients included in this study was 55.5±5.38 in group A and 56.6±7.33 in group B . All patients included in this study were of primary open angle glaucoma with no history of previous ocular surgery, laser therapy or significant Opthalmological or systemic disease. Out of 36 patients, 18 patients underwent square scleral flap trabeculectomy with 5-FU and 18 patients received triangular scleral flap trabeculectomy with 5-FU. The result of present study was observed on the basis of intraocular pressure and post operative complications. Thus the trabeculectomy success rate of group A (94.4%) was significantly higher than the patients of group B 77.7%.

So, statistically there was significant difference between group A (square scleral flap 5-FU) and group B (Triangular scleral

flap with 5-FU) ($p<0.05$) regarding the intraocular pressure and post operative complications.

Thus we concludes as follows:-

1. The intraocular pressure lowering effect of square flap with 5-FU is better than triangular scleral flap with 5-FU.
2. The incidence of post operative complications of square scleral flap with 5-FU is less as compare to triangular scleral flap with 5-FU.

Thus the square scleral flap with 5-FU is better technique in trabeculectomy surgery as compare to triangular scleral flap with 5-FU.

Now our study support square scleral flap with 5-FU better intraocular pressure control as compare to triangular scleral flap with 5-FU with lesser post operative complications.

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FORMAT

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Comparative study of square / triangular scleral flap in trabeculectomy along with 5-FU.

Name :

Age :

Sex :

Address :

Date of starting of treatment:

Short H/O present illness:

1. Seeing halos.
2. Early onset of presbyopia.
3. Frequent changes of glasses.
4. Mild headache and heaviness.
5. Use of topical eye drops like miotics or steroids.
6. History of diabetes.
7. Any vascular occlusive disease like central retinal vein occlusion.
8. History of trauma, operation, post inflammation.

Family History:

1. Glaucoma
2. Hypertension

Personal History:

1. Smoking
2. Alcoholism

Investigation:

1. Ophthalmoscopy
2. Indentation tonometery (Schiotz tonometery)
3. Tomography
4. Gonioscopy

5. Perimetry

Ophthalmic Examination:

Feature	**R/E**	**L/E**
Eyelid		
Eyelashes		
Conjunctiva		
Sclera		
Cornea		
Anterior chamber		
Pupil		
Lens		
Tension		
Vision		
- without glasses		
- with glasses		
- Type of refrective error		
- Power of lens for distance vision		
- Power of lens for near vision		
- Vision with pin hole		

Fundus examination:

1. Pallor and cupping of the optic disc
2. Cup-disc ratio
3. Notching of the cup rim
4. Concentric enlargement of the cup
5. Haemorrhage on the disc
6. Looping of retinal venis
7. Optic nerve atrophy